

Appl. No. 09/783,377

REMARKS

Claims 21 and 33 are amended. New claims 35-44 are added. Claims 21-28 and 32-44 are pending in the application.

Claim 33 stands rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. The Examiner states that the recited "size greater than or equal to 1,000 millimeters" is unclear as to which size it is referring. Without admission as to the propriety of the Examiner's rejection, claim 33 is amended to recite a size of greater than or equal to $860 \times 910 \times 19 \text{ mm}^3$. The amendment to claim 33 is supported by the specification at, for example, page 3, lines 11-14. Accordingly, applicant respectfully requests withdrawal of the § 112 rejection of claim in the Examiner's next action.

Claims 21 and 22 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Dunlop et al., U.S. Patent No. 5,809,393. The Examiner is reminded by direction to MPEP § 2131 that anticipation requires each and every limitation of a claim to be disclosed within a single prior art references. Claims 21 and 22 are allowable over Dunlop for at least the reason that Dunlop fails to disclose each and every limitation in either of those 2 claims. As amended, independent claim 21 recites a physical vapor deposition target consisting essentially of aluminum having a purity of at least 99.999 atomic percent, and less than or equal to 1000 ppm of one or more dopant materials selected from the recited group. The amendment to claim 21 is supported by the specification at, for example, page 4, lines 11-13; page 5, lines 3-4; page 12, lines 5-20; page 13, lines 12-15; and Figs. 9, 10 and 12. Dunlop discloses formation of a target which can comprise aluminum, utilizing liquid dynamic compaction or using liquid dynamic compaction combined with equal channel

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angular extrusion (ECAE) (col. 4, ll. 10-48). Dunlop does not disclose or suggest the claim 21 recited physical vapor deposition target consisting essentially of aluminum having a purity of at least 99.999 atomic percent and the recited amount of dopant materials. Accordingly, independent claim 21 is not anticipated by Dunlop and is allowable over this reference.

Dependent claim 22 is allowable over Dunlop for at least the reason that it depends from allowable base claim 21.

Claims 32 and 34 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Dunlop et al. The Examiner states, at page 3 of the present Action, that Dunlop discloses the claim 32 recited target made by a process including casting, and directs attention to Fig. 4 to support this statement. The Examiner is mistaken.

Referring to Dunlop at column 5, lines 16-30, Dunlop discusses and compares various conventional methods of obtaining targets utilizing methods such as casting or processing of powders. At column 6, lines 11-27, with reference to Figs. 3 and 4, Dunlop compares and contrasts liquid dynamic compaction methods and continuous casting methods. With respect to Fig. 4, which is relied on by the Examiner to show casting, Dunlop specifically compares this figure with Fig. 3 to show the advantageous use of LDC as shown in Fig. 3. Throughout the remaining Dunlop disclosure, Dunlop sets forth various advantages of utilizing the liquid dynamic compaction methods described therein. Nowhere does the Dunlop disclosure teach utilizing a cast material. Accordingly, Dunlop fails to teach or suggest each and every limitation of independent claim 32, and claim 32 is allowable over this reference.

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Dependent claim 34 is allowable over Dunlop for at least the reason that it depends from allowable base claim 32.

Claims 23-28 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Dunlop in view of Ueda, U.S. Patent No. 5,541,007. The Examiner is reminded by direction to MPEP § 2143 that a proper obviousness rejection has the following three requirements: 1) there must be some suggestion or motivation to modify or combine reference teachings; 2) there must be a reasonable expectation of success; and 3) the combined references must teach or suggest all of the claim limitations. Claims 23-28 are allowable over Dunlop in view of Ueda for at least the reason that the references, individually or as combined, fail to teach or suggest each and every limitation in any of those claims.

As discussed above with respect to independent claim 21, Dunlop does not disclose the recited aluminum having a purity of at least 99.999 atomic percent. As discussed in applicant's specification at, for example, page 12, lines 5-23, utilization of ECAE to deform high purity materials is novel relative to previous EACE applications such as Dunlop. As discussed, high purity metals are typically not heat treatable and ordinary processing steps can be difficult if not impossible to apply with high purity metals. Additionally, as discusses at page 5, lines 3-4, high purity aluminum is typically provided as cast ingot with coarse dendrite structures. The Dunlop disclosure does not disclose or suggest utilizing cast materials or the claim 21 recited aluminum having a purity of at least 99.999 atomic percent and less than or equal to 1000 ppm of the recited elements.

In addition to the features discussed above, independent claim 21 additionally recites that the target has an average grain size of less than 100 microns. Ueda

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specifically discloses a material having an average grain size of from 0.1 to 0.5 mm (col. 3, ll. 13-14). At page 5 of the present action, the Examiner states that Ueda's teaching "overlaps applicant's endpoint of 100 microns or less grain size". Applicant notes that applicant's recited average grain size of less than 100 microns does not overlap Ueda's teaching of 0.1 to 0.5 mm and that the Examiner's indication at page 5 of the present action that "the grain sizes can be the same" is in error. In addition to the above, Ueda does not disclose or suggest claim 21 recited level of aluminum purity of at least 99.999 atomic percent. As combined, Ueda and Dunlop fail to disclose the claim 21 recited physical vapor deposition target consisting essentially of aluminum having a purity of at least 99.999 atomic percent and the one or more dopant materials and having an average grain size of less than 100 microns. Accordingly, independent claim 21 is not rendered obvious by the combination of Dunlop and Ueda and is allowable over these references.

Dependent claims 23-28 are allowable over the combination of Dunlop and Ueda for at least the reason that they depend from allowable base claim 21.

Claim 33 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Dunlop. As discussed above with respect to independent claim 32, Dunlop fails to disclose the recited physical vapor deposition target made by a process including casting. Further, Dunlop does not suggest the claim 32 recited target made by a process including casting and consisting essentially of aluminum and one or more dopant materials and having an average grain size of less than 100 microns. Dependent claim 33 is allowable over Dunlop for at least the reason that it depends from allowable base claim 32.

Claims 35-44 do not comprise "new matter" since each is fully supported by the specification as originally filed. Claims 35-44 are supported by the specification at, for

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example, page 4, lines 11-13; page 5, lines 3-4; page 12, lines 5-20; page 13, lines 12-15; page 8, lines 1-24; page 12, lines 5-20, page 13, line 4 through page 14, line 1; Figs. 9 and 10, and page 16, lines 16-25.

For the reasons discussed above, claims 21-28 and 32-34 are allowable, and claims 35-44 are believed allowable. Accordingly, applicant respectfully requests formal allowance of pending claims 21-28 and 32-44 in the Examiner's next action.

Respectfully submitted,

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Title: Methods of Forming Aluminum-Comprising Physical Vapor Deposition Targets;
Sputtered Films; and Target Constructions

**VERSION WITH MARKINGS TO SHOW CHANGES MADE ACCOMPANYING
RESPONSE TO OCTOBER 15, 2002 FINAL OFFICE ACTION**

In the Claims

The claims have been amended as follows. Underlines indicate insertions and ~~strikeouts~~ indicate deletions.

21. (Amended) A physical vapor deposition target consisting essentially of:
aluminum having a purity of at least 99.999 atomic percent; and

less than or equal to 1000 ppm of one or more dopant materials comprising elements selected from the group consisting of Ac, Ag, As, B, Ba, Be, Bi, C, Ca, Cd, Ce, Co, Cr, Cu, Dy, Er, Eu, Fe, Ga, Gd, Ge, Hf, Ho, In, Ir, La, Lu, Mg, Mn, Mo, N, Nb, Nd, Ni, O, Os, P, Pb, Pd, Pm, Po, Pr, Pt, Pu, Ra, Rf, Rh, Ru, S, Sb, Sc, Se, Si, Sm, Sn, Sr, Ta, Tb, Te, Ti, Tl, Tm, V, W, Y, Yb, Zn and Zr; the physical vapor deposition target having an average grain size of less than 100 microns.

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33. (Amended) The physical vapor deposition target of claim 32 having a size of greater than or equal to 860 x 910 x 19 mm³ ~~1000 millimeters~~.

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